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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/619,768	07/19/2000	Masataka Fukuizumi	000810	1751

23850 7590 10/30/2002

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ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 10/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

YB

Office Action Summary	Application No.	Applicant(s)	
	09/619,768	FUKUIZUMI ET AL.	
	Examiner	Art Unit	
	Brian R. Gordon	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 August 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) *1-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-16, 20-23, 29, 30-31, 34, 35, and 36-39* is/are rejected.

7)☒ Claim(s) *17-19,24-28,32 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Claims 1-12 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Response to Arguments

3. Applicant's arguments filed August 26, 2002 have been fully considered but they are not persuasive.

As to the arguments directed to claims 13-15, 23, 29, 34, 37, and 38 rejected under 35 U.S.C. 102(b) as being anticipated by Nakajima et al., applicant recites that that "the liquid discharge control unit (24) according to the present invention controls the discharge amount of the chemical agent form the preparation tank 21 as described on page 6, lines 23 to 30." The claims are interpreted in light of the specification; however,

the claim 13 recites "a liquid discharge control unit for discharging a predetermined amount of chemical solution from the dissolution unit" (not preparation tank). Applicant also recites that column 6, lines 64-67 describe the opening/closing valve 19, the examiner disagrees for lines 64-67 make no references to elements 18 or 19. Column 6 lines 49-67 are recited as:

Referring again to FIG. 1, the substrate cleaning apparatus works in the following manner. Under initial conditions, all the opening/closing valves 19, 33, 49, and 59 are in closed positions. The opening/closing valve 33 on the pure water supply system 7 is opened first to supply a flow of pure water through the pure water supply opening 30 into the process tank 1. The process tank 1 is then filled gradually with pure water. After the process tank 1 is completely charged with pure water, the whole pipe conduit 11 of the circulation system 5 is gradually filled with pure water. Then, while the opening/closing valve 33 is closed the opening/closing valve 19 on the circulation system 5 is opened, which results in opening of the pipe conduit 11 of the circulation system 5 and making pure water in the process tank 1 run through the circulation system by the operation of the pump 13.

The first opening/closing valve 49 on the gas supply system 9 is subsequently opened to allow hydrogen chloride gas from the hydrogen chloride gas supply 40 to be fed into the mixing unit 17 of the circulation system 5.

Furthermore, it is unclear what is the difference between the dissolution unit and the preparation tank. As it appears in Figure 2, it appears as if the entire apparatus is the dissolution unit (22) that comprises the preparation tank (21). Or from the claims, the apparatus comprises the dissolution unit (22) and a preparation tank 21; in this case it is not clear how the dissolution comprises the preparation tank for this is not described as such on page 7 line 21-34 and furthermore the preparation tank was claimed as an

element of the apparatus (not the dissolution unit) in the original claims. As such, the 102 rejection of claims 13-15, 23 under Nakajima is hereby maintained.

In light of applicant's arguments, the 102 rejection of claims 29, 34, 37, and 38 under Nakajima is herby withdrawn.

As to the arguments directed to claims 13-15, 20, 29, 34, 37, and 38 rejected under 35 U.S.C. 102(b) as being anticipated by Nelson et al., applicant states that the flow rate of chemical agent from the preparation tank (21) is changed by the liquid discharge control unit 24 which is different from the fixed orifice 28 of Nelson. Column 10, lines 9-42 disclose:

The pressurized liquid outlet conduit (6) may further comprise a liquid drain line (26) through which a relatively minor flow of admixture can be drawn so that system (1) can be continuously operated, even absent demand for admixture from outlet (40). Additionally, drain line (26) provides a convenient location to place an ozone concentration sensor (27), by which the ozone concentration of the admixture can be monitored.

The flow rate through drain line (26) is preferably maintained at such a rate that system (1) may be kept operational, but at a low enough rate so that excessive amounts of water and ozone are not wasted. For example, for a system in which ozone flow into pressurized vessel (2) is 1.0 to 25.0 l/min, flow through drain line (26) is suitably established at 0.2 to 1.0 l/min. Preferably, flow through drain line (26) will remain constant at from about 0.4 l/m to about 0.6 l/m. Furthermore, in addition to concentration sensor (27), drain line (26) comprises a fixed orifice (28) **for limiting the flow of ozonated water through** the ozone concentration sensor (27). Additionally, if drain line (26) is to be employed, it is preferred that drain (29) be included on drain line (26).

Referring now to FIGS. 2 and 3, there is illustrated a side view of a preferred embodiment of a spray post (200) suitable for use as outlet (40) as illustrated in FIG. 1 of the present invention. Generally, spray post (200) is configured **to controllably atomize** a stream of ozonated water under conditions such that relatively

large droplets of the stream are formed and then allowed to contact with the surface to be treated. By subjecting the stream of ozonated water to controlled atomization in this way, a greater quantity of ozone remains in solution for more effective treatment of the surface. That is, the droplets created by controlled atomization would be supersaturated with ozone.

Claim 13 recites, "a liquid discharge control unit for discharging a predetermined amount of chemical solution from the dissolution unit, the examiner asserts that the spray post controls the amount of water atomized and the drain line and orifice limit/control the amount of water.

As to the adjusting of the ozone gas Nelson discloses:

The configuration of pressurized gas outlet (39) helps motivate admixture from pressurized vessel (2) through pressurized liquid outlet conduit (6). Specifically, **the flow of undissolved gas exhausted through pressurized gas outlet conduit (39) is restricted sufficiently** to maintain a back pressure with respect to pressurized vessel (2). This back pressure helps push admixture out of pressurized vessel (2) through pressurized liquid outlet conduit (6). As is shown, back pressure regulator (7) is used to restrict gas flow through pressurized gas outlet conduit (39), but **any other kind of suitable flow restriction componentry could be used as desired.**

The examiner asserts that the passage above clearly discloses a gas discharge unit.

In light of applicant's arguments, the 102 rejection of claims 29, 34, 37, and 38 under Nakajima is herby withdrawn.

As to applicant's arguments as addressed to the rejection of claims 13-16, 20, 23, 29, 34-35, 37 and 38 under 35 U.S.C. 102(b) as being anticipated by Nurmi, applicant recites that the objective and the function of the apparatus of Nurmi is different

that of the present invention. This may be true however, the objective and function has no bearing on the structure. The objective and function is considered intended use.

It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex parte Masham, 2 USPQ2d 1647 (1987).

As to the reference to the discharge units, Nurmi discloses **manual** valves V6 and V5 that may be operated as desired by the operator.

The examiner asserts that the device of Nurmi has every element as claimed by applicant and the device of Nurmi may be also operated to achieve the same objective as that of applicant.

As such the previous 102 rejection of claims of claims 13-16, 20, 23, 29, 34-35, 37 and 38 under 35 U.S.C. 102(b) as being anticipated by Nurmi is hereby maintained.

As to applicant's arguments as addressed to the 102 rejection claims 13-16, 23, 29, 34, and 38 under Ginsburgh et al., applicant recites that Ginsburgh does not teach a gas discharging control unit. The examiner respectfully disagrees for Ginsburgh recites:

FIGS. 1-4 and FIGS. 7-10, includes a safety-enhanced or improved combustion fuel mixing means which is contained substantially within the interior of mixing receptacle(s) 20 and optionally includes one or more receptacle-content re-circulating conduit 38 for re-circulating or recycling inert gas, fuel, and/or safety-enhanced fuel within receptacle(s) 20.

In FIG. 3 a safety-enhanced fuel mixing apparatus 10 is shown illustrating a mixing receptacle 20 having an internal hydrocarbon fuel atomizing means 34 and/or an inert gas diffuser means 40 (or inert gas infusing means). Fuel atomizing means 34 is controlled by fuel control means 26 which is connected to an external fuel source, and inert gas diffuser means 40 is

controlled by gas control means 28 which is connected to an external inert gas source. An optional re-circulating conduit 38 is shown connected to each of the control means 26 and 28 respectively, such that the fuel and/or gas can readily be re-circulated within the mixing receptacle 20 as needed before being transferred out of safety-enhanced fuel outlet 36.

Since the gas is recirculated then that implies that it exits the system and then is eventually returned.

As such, the to the 102 rejection claims 13-16, 23, 29, 34, and 38 under Ginsburgh et al. is hereby maintained.

As to applicant's arguments as addressed to the 103 rejections claims 20-21 and 20-22, 30-31, and 36, the rejections are hereby maintained for the reasons given above.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites "a liquid discharge control unit for discharging a predetermined amount of chemical solution from the dissolution unit" (not preparation tank). It is unclear what is the difference between the dissolution unit and the preparation tank. As it appears in Figure 2, it appears as if the entire apparatus is the dissolution unit (22) that comprises the preparation tank (21). Or from the claims, the apparatus comprises the dissolution unit (22) and a preparation tank 21; in this case it is not clear how the

ok

dissolution comprises the preparation tank for this is not described as such on page 7 line 21-34 and furthermore, the preparation tank was claimed as an element of the apparatus (not the dissolution unit, claim 14) in the original claims. Ok

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 13-15, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakajima et al. + 24

Nakajima et al. discloses a device that includes a container adapted to treat the substrate with the liquid chemical agent, the container having an inlet and an outlet; circulation means connecting the inlet and the outlet of the container, and having a circulation pump; a liquid reservoir; a gas supply; and a gas-liquid mixer for synthesizing the liquid chemical agent connected to the liquid reservoir and gas supply, and having an outlet for the liquid chemical agent connected to the circulation means. The device includes chemical concentration detection means disposed in the circulation means; and means for regulating the mixing ratio of the gas to the liquid connected to the Chemical concentration detection means and the mixer (concentration adjusting means).

The chemical concentration detection means may be a sensor for detecting a pH of the liquid chemical agent. Alternatively, the chemical concentration detection means

includes a light source arranged to emit a light beam through the liquid chemical agent; means for detecting the intensity of the light beam passing through the liquid chemical agent; and means for correlating the intensity of the light beam detected with the concentration of a specific chemical in the liquid chemical agent.

The device comprises a pure water supply system 7 that includes a pure water supply 30 (preparation tank for storing a liquid) and pipe conduit 11 and gas supply system with conduits 41, 51; gas supply 40, 50; gas regulators 43,53. The device further comprises mixing unit 17 (dissolution unit), gas outlet 17d that has an electric motor operated valve 18 that is capable of controlling the discharge of undissolved gas, and liquid outlet 17d that comprises valve 19 (discharge control units).

8. Claims 13-15, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Nelson et al. US 5,971,368.

Nelson et al. disclose a system to increase the quantity of dissolved gas in a liquid. System (1), as illustrated, is adapted for the production of ozonated water, however, the principles of the present invention are applicable to any liquid/gas solution. System (1) generally comprises a pressurized vessel (2)(dissolution unit) having an internal volume (30) within which a body of liquid (31) is contacted with a gas (32). Gas (32) is dissolved in liquid (31) as a result of such contact. Liquid (31) is supplied to pressurized vessel (2) through liquid inlet port (33) at the top of pressurized vessel (2), and gas (32) enters the pressurized vessel (2) through bubbler (34) positioned at the bottom of pressurized vessel (2). Thus, gas (32) percolates upward through pressurized vessel (2) while liquid (31) generally flows downward. Such counterflow of gas (32) and

liquid (31) provides a relatively long period of contact between gas (32) and liquid (31), thereby facilitating the dissolution of gas (32) in liquid (31). Pressurized vessel (2) is connected to liquid source (4) by liquid conduit (35) for supplying the desired liquid to the pressurized vessel (2). In a preferred embodiment, liquid source (4) supplies ultrapure deionized water through liquid conduit (35) to pressurized vessel (2). Optionally, liquid conduit (35), may comprise liquid pressure regulator (20) and liquid pressure gauge (21) to control the pressure of liquid (31) flowing to pressurized vessel (2). Flow from liquid source (4) into pressurized vessel (2) is further preferably controlled by liquid valve (22) that is responsive to liquid sensing device (3). Liquid sensing device (3) is positioned on pressurized vessel (2) such that liquid sensing device (3) is capable of detecting an amount of liquid (31) in the pressurized vessel (2). In this manner, the transport of the liquid from the liquid source (4) to the pressurized vessel (2) may be controlled in response to a signal from the liquid sensing device (3). Ozone is supplied to pressurized vessel (2) through pressurized gas conduit (18). Since ozone has a relatively short half life, it is preferred that it be supplied on demand from, e.g., ozone gas generator (5). However, any ozone source capable of maintaining a generally continuous flow of ozone may be used. In the embodiment shown, the ozone gas generator (5) is of the type that uses electricity to generate ozone from oxygen. Oxygen is supplied from an oxygen gas facility (10) to ozone gas generator (5) through conduit (36). Conduit (36) comprises a precursor supply pressure regulator (15), a precursor supply pressure gauge (11), a precursor supply 2-way valve (12) and a precursor supply mass flow controller (13). These fixtures are included to control the

flow rate of oxygen. Cooling media (14), preferably water, is supplied to the ozone gas generator (5) through a cooling media valve (16). Cooling media (14) flows through ozone gas generator (5) and exits through cooling media drain (38).

The device also comprises gas outlet conduit (39) and liquid outlet (6). Pressurized gas outlet conduit (39) is coupled to the pressurized vessel (2) such that undissolved gas can be withdrawn from the pressurized vessel (2). The second outlet conduit positioned on pressurized vessel (2) is preferably a pressurized liquid outlet conduit (6) positioned such that an amount of the liquid comprising an amount of dissolved gas can be withdrawn from the pressurized vessel (2).

Nelson et al. further disclose the employment of sensors to measure the concentration of the dissolve ozone in the water.

9. Claims 13-16, 20, 23, 29, 34-35, 37 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Nurmi US 6,135,433.

Nurmi discloses a system and method for saturating a gas with a vapor from a liquid chemical. The system includes: (a) a saturation vessel (dissolution unit) connected to receive a liquid chemical and a carrier gas; (b) a gas sparger (bubbler) in the saturation vessel for sparging the carrier gas into the liquid chemical; (c) means for maintaining the liquid chemical in the saturation vessel at a substantially constant level; (d) means for controlling the temperature of the liquid chemical in the saturation vessel to a desired value, comprising (I) a system for cooling the liquid chemical, and (ii) a heater inside the saturation vessel extending vertically in the liquid a distance at least half of the height of the liquid chemical level for heating the liquid chemical; and (e)

means for controlling the pressure of the saturated gas to a desired value. The invention also relates to novel methods and systems for controlled delivery of a vaporized liquid chemical. The invention has particular applicability to the semiconductor manufacturing industry.

A carrier gas is delivered from a carrier gas source 102 through line 104 to a saturation vessel or bubbler 106, which contains a volatile liquid chemical. The carrier gas is bubbled through the liquid chemical in the saturation vessel 106 to form a saturated gas of desired concentration. The carrier gas source 102 can be, for example, a gas cylinder or a bulk storage vessel.

The device comprises liquid supplies 108, 110 that store the liquid chemical.

Liquid containers 108, 110 are connected through a system of tubing and valves to allow the liquid chemical to be introduced into the saturation vessel 106. The tubes used to transport the liquid chemical through the system are preferably flexible hoses constructed of Teflon lined stainless steel. Containers 108, 110 can be connected to the saturation vessel by individual lines that converge into a single line 112. Optionally, one or more additional saturation vessels can be supplied with the liquid chemical via branch lines 112', 112".

Various connections on the saturation vessel are preferably disposed at a top portion thereof. A first connection 122 is connected to the liquid supply system described above, for introducing the liquid chemical into the saturation vessel. The first connection 122 includes a manual valve V3 connected to a tube that penetrates through the top of the saturation vessel and extends nearly to the vessel bottom. Preferably, the

tube extends to within a few inches of the vessel bottom. Second connection 124 is connected by tubing to the carrier gas supply 102 for introducing the carrier gas into the saturation vessel. Second connection 124 includes a manual valve V4 connected to a tube that penetrates through the top of the saturation vessel. The end of the tube of second connection 124 is connected to a gas dispersing structure 126 which has perforations through which the carrier gas flows and is dispersed into the liquid chemical.

Preferably, the dispersing structure 126 includes a plurality of sintered metal tubes and is disposed at or near the bottom of the saturation vessel. The gas dispersing structure permits fine bubbles to be produced in the liquid chemical to allow intimate contact between the carrier gas and the liquid chemical.

As the carrier gas is introduced into the liquid chemical, bubbles pass up through the liquid chemical, eventually becoming saturated with the chemical vapor. The saturated vapor is removed from the saturation vessel through a third connection 134 which includes a manual valve V5. The saturated vapor exiting the saturation vessel is conducted through tubing 138 to the point of use, for example, one or more semiconductor processing tools. The tubing can be divided downstream into a plurality of branch lines 140, 142 and 144 for this purpose. One of the branch lines can optionally be connected to an analytical tool, such as a concentration sensor, for verification of the saturated gas product.

The saturation vessel preferably includes a fourth connection 146 which allows one to remove any remaining liquid chemical from the vessel when the vessel is to be

serviced. The fourth connection 146 includes a manual valve V6 connected to tubing which penetrates through the top of the saturation vessel and extends to the bottom of the vessel.

To ensure a substantially constant vapor/liquid contact time between the carrier gas and liquid chemical, it is important that the liquid chemical in the saturation vessel be maintained at a substantially constant level. The liquid level can be controlled by various means. In accordance with an exemplary aspect of the invention, the liquid content in the saturation vessel is preferably controlled by monitoring the mass or weight of the saturation vessel. For this purpose, a mass or weight scale 148 can be disposed beneath the saturation vessel to continuously measure the mass or weight of the vessel. A signal from scale 148 is sent to a controller 150 which controls operation of the liquid supply system based on the weight measurement. Controller 150 sends a signal to a valve 152 which it continuously controls the flux of liquid introduced into the saturation vessel to maintain a constant liquid level therein.

To prevent condensation of the chemical vapor in the saturated gas, the liquid chemical in the saturation vessel is cooled to a desired temperature below ambient temperature.

10. Claims 13-16, 23, 29, 34, and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Ginsburgh et al. US 6,293,525.

Ginsburgh et al. disclose an efficient and economical mixing apparatus 10 for exposing a controllable and/or optimal volume of inert gas such as CO.sub.2 to a controllable and/or optimal volume of hydrocarbon fuel (e.g. Jet fuel, Diesel fuel, engine

fuels, fuel oils and the like). The mixing apparatus 10 comprise at least one mixing receptacle 20 (dissolution unit) suitable for the mixing of fuel 24 and inert gas 18 therein, with mixing receptacle 20 having at least one controllable fuel inlet/coupling means 32 to receive hydrocarbon fuel from a hydrocarbon fuel supply (storage tank) as directed by fuel control means 26, and at least one controllable gas inlet/coupling means 30 to receive inert gas such as CO_2 as directed by gas control means 28 from a controllable inert gas supply comprising one or more inert gas. Controllable inert gas inlet/coupling means 30 optionally includes the control means to determine fixed inert gas pressures, send pure inert gas through the mixing receptacle, and/or provide a variable range of inert gas pressures, including when appropriate, negative pressures. The device further comprises diffuser 40 (bubbler).

It is noted that fuel control means 26 can optionally be supplied by any one or more of a variety of fuel sources including fuels suppliable in various temperatures such as chilled fuel, and/or fuel otherwise optimized for inert gas absorption such as hydrocarbon fuel with additional light hydrocarbon atoms. Similarly, inert gas such as CO2 can readily be stored in a chilled non-gaseous state e.g. liquid (cooling unit) or solid and used as an inert gas supply--including a gas supply that when expanding during phase conversion provides a naturally occurring positive pressure source.

Mixing receptacle 20 has one or more safety-enhanced or improved combustion fuel outlet/coupling means 36 (liquid discharge), which is connectable with an inert gas-enriched fuel distribution means such as outlet control means 46, to convey safety-enhanced fuel as needed. The control means 26, 28 and 46, are comprised of any one

or more in a variety of known control device(s) such as automated, computer-controlled, or manually controlled, pump(s), valve(s), re-circulating device(s), manifold(s), and the like. Alternatively, the mixing receptacle(s) 20 can also comprise any one or more in a variety of known measuring and/or monitoring means 78, such as monitoring, measuring, reporting device(s) and/or instruments used to measure or regularly sample pressure, temperature, chemistry composition, gas concentration levels (concentration measurements), and the like, including the incorporation of monitoring means communication signal 80 with receptacle-content control means 82 (fuel control means 26, inert gas control means 28, and safety-enhanced fuel control means 46, inclusively) in order to facilitate the automation of optimal mixing of the inert gas in the hydrocarbon fuel. Communication signal 80 can be transmitted through a suitable conduit connected between monitoring means 78 and any one or more of the control means, or alternatively can be transmitted by wireless transmission, in which case monitoring means 78 and any one or more of the control means are comprised of communicating transmitter(s) and receiver(s) respectively.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 29, 34, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson et al.

Nelson et al. does not specifically recite that the dissolution unit cools the chemical reagents during preparation.

However, Nelson does state that U.S. Pat. No. 5,464,480 discloses a process for removing organic materials from semiconductor wafers using ozonated water. Specifically, this patent teaches that high ozone concentration water, suitable for use in

the disclosed process may be obtained by mixing ozone and water at a temperature of from about 1degree C to 15 degree C.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Nelson to include means for cooling the mixing chamber in order to increase the amount of dissolved gases in aqueous solutions.

15. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nurmi.

As to claims 21-22, Nurmi does not specifically refer to the element that produces the bubbles within the vessel as a nozzle. However, it is obvious that the element may be referred to as a nozzle. As to the inclination of the nozzle, which is a design modification that allows for the bubbles to contact a deflection plate in the vessel to control the flow of the bubbles upward through the liquid, the examiner hereby asserts that such a structure design is well known in the art for controlling the flow of fluid in a circulation tank. For example, in aeration systems it is well known to employ "baffles" (deflection plates) to control or divert the flow or circulation of fluid in the systems.

16. Claims 20-22, 30-31, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakajima et al. as applied to claims 13-15, 23, 29, 34, 37, and 38 above, and further in view of Sakamoto Naoki, JP 6-37080.

Nakajima et al. does not specifically recite that the device comprises an inclined nozzle to produce bubbles that contact a deflection plate.

Sakamoto discloses a device in which a line is used to bubbling a gas into a chemical solution for the fabrication of semiconductor wafers.

It is obvious that the line inserted in the chemical solution may be referred to as a nozzle. As to the inclination of the nozzle, which is a design modification that allows for the bubbles to contact a deflection plate in the vessel to control the flow of the bubbles upward through the liquid, the examiner hereby asserts that such a structure design is well known in the art for controlling the flow of fluid in a circulation tank. For example, in aeration systems it is well known to employ "baffles" (deflection plates) to control or divert the flow or circulation of fluid in the systems.

As to claim 31, it would have been obvious to one of ordinary skill in the art to purify the gas to be used in the fabrication process. For example, it is well known in the art of manufacturing semiconductors via deposition processes (such as CVD) that purified gases (free of unwanted contaminants) are used.

As to claim 36, it would have been obvious to employ a common means such as a filter to separate the gas from the solution. The process of removing a gas from a liquid by using a filter that is permeable only to gas allows for the removal of bubbles or recycling of unused gas to maintain a system that operates at a high efficiency level.

Allowable Subject Matter

17. Claims 17-19, 24-28, and 32-33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: The prior art, Nakajima et al, Ginsburgh et al., Nelson et al., and Nurmi do not disclose elements such as that claimed by applicant: the particulars of the cooling unit

(in claims 17-19 and 27), concentration measuring device (claims 24-26), the purifying system (claim 31), the collection unit (claims 32-33), nor the hydrophobic filter (claim 36).

Conclusion

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian R. Gordon whose telephone number is (703) 305-0399. The examiner can normally be reached on M-F, with 2nd and 4th F off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 703-308-4037. The fax phone numbers for

the organization where this application or proceeding is assigned are (703) 305-7719 for regular communications and (703) 305-3014 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

brg
October 25, 2002

Jill Warden
Supervisory Patent Examiner
Technology Center 1700